

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER

TYPE 8188

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Tetrode.
 See figure 1.
 Mounting position: 6/
 Weight: 9 ounces (255.15 grams) nominal.

ABSOLUTE RATINGS: F = 110 MHz

Parameter:	Ef	eb	Eb	Ec1	Ec2	Ib	ib	ik
Unit:	V ac <u>1/</u>	kv	kV dc	V dc	V dc	mA dc	a	a
Maximum:								
Pulse mod (R load)	5.0 ±5%	---	20	-1,000	2,500	---	4.0	6.0
Anode pulsed (Osc or amp)	5.0 ±5%	15	---	-1,000	2,500	---	---	6.0
Grid pulsed (Osc or amp)	5.0 ±5%	---	10	-1,000	2,500	---	---	6.0
Test conditions:	5.0	---	2.5	Adj	500	160	---	---

ABSOLUTE RATINGS: F = 110 MHz

Parameter:	Pp	Pg2	Pg1	TE	T(seal)	Du	Cooling
Unit:	W	W	W	°C	°C <u>2/</u>	--- <u>3/</u>	--- <u>4/</u>
Maximum:							
Pulse mod (R load)	400	35	10	225	200	---	---
Anode pulsed (Osc or amp)	400	35	10	225	200	---	---
Grid pulsed (Osc or amp)	400	35	10	225	200	---	---
Test conditions:	---	---	---	---	---	---	<u>5/</u>

See footnotes at end of table I.

GENERAL:

Qualification: Required.

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TABLE I. Testing and inspection.

Inspection	Method MIL-STD- 1311	Notes	Conditions	Acceptance Level 11/	Symbol	Limits		Unit
						Min	Max	
<u>Conformance inspection, part 1</u>								
Filament current	1301	---		0.65	If	13.7	14.9	A ac
Peak emission	1231	---	eb = ec1 = ec2 = 2,500 v	0.65	is	7.0	---	a
Total grid current	1266	---		0.65	Ic1	---	-10	μA dc
Electrode voltage (grid)	1261	---		0.65	Ec1	-55	-80	V dc
Primary-grid emission (control)	1266	---	Ef = 5.5 V ac; t = 15; Ic1 = 165 mA dc; anode and screen grid floating	0.65	Isgp	---	-100	μA dc
Primary-grid emission (screen)	1266	---	Ef = 5.5 V ac; t = 15; Ic2 = 135 mA dc; Ec1 = 0; anode floating	0.65	Isg2	---	-200	μA dc
Electrode voltage (grid)	1261	---	Eb = 20 kV dc; Ec2 = 1,500 V dc; Ec1/Ib = 10 μA dc	0.65	Eco	---	-675	V dc
High-voltage operation	---	Z/	Eb = 25 kV dc; Ec2 = 2,500 V dc; Ec1 = -1,000 V dc (max); tp = 10 μs; prf = 2,000; egk/Ib = 0.6 a	0.65	---	---	---	---
<u>Conformance inspection, part 2</u>								
Low-frequency vibration	1031	---	No voltages applied	---	---	---	---	---
RF useful output power	2214	---	Eb = 3,000 V dc; Ib = 350 mA dc; Ec2 = 500 V dc; F = 110 MHz (min)	---	Po	500	---	W (useful)
Current division (method B, short pulse)	1372	---	Eb = 2,000 V dc; Ec2 = 1,500 V dc; Ec1 = -500 V dc; tp = 15 μs (max); egk/Ib = 4 a	---	{ egk ic1 ic2	{ --- --- ---	{ 200 150 500	{ v ma ma
Direct-interelectrode capacitance	1331	---		---	{ Cgp Cin Cout	{ --- 10.7 4.2	{ 0.17 14.5 5.6	{ pF pF pF

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD- 1311	Notes	Conditions	Acceptance Level <u>11/</u>	Symbol	Limits		Unit
						Min	Max	
<u>Conformance inspection, part 3</u>								
Life test	---	<u>9/</u>	Group C; RF useful output power; t = 500 hours	---	---	---	---	---
Life-test end points:	---							
Peak emission	1231	---		---	is	5.6	---	a
Primary-grid emission (control)	1266	---		---	lsg1	---	-100	μA dc
Primary-grid emission (screen)	1266	---		---	lsg2	---	-200	μA dc
Shock, specified pulse	1042	<u>8/ 10/</u>	No voltages applied; accel = 15 G peak (min); D = 11 ± 2 ms half-sine wave	---	---	---	---	---
Shock, specified pulse end points:	---							
Electrode voltage (grid)	1261	---		---	Ec1	-55	-80	V dc
Total grid current	1266	---		---	lc1	---	-10	μA dc

- 1/ Filament voltage shall be maintained as closely as possible, since the peak current capability of the tube is dependent on filament voltage. A decrease in peak currents may be expected if the voltage falls below normal, while higher voltages may result in decreased tube life. Filament voltage shall be measured directly at the socket.
- 2/ It is recommended that a heat-dissipating connector (EIMAC type HR-6, or equivalent) be used on the anode terminal in all RF applications.
- 3/ During operation under pulsed conditions, duty shall be maintained at a low enough level that average tube element dissipation ratings are not exceeded. For pulse lengths in excess of 0.1 second, some reduction of element dissipation ratings will be required. During anode pulsed operation, for applied eb values in excess of 10 kv, the maximum allowable pulse length is 10 μs.
- 4/ Adequate forced-air cooling shall be provided to maintain base and anode seal temperatures below their maximum ratings. In all cases of operation, the use of the heat-dissipating connector is recommended and a socket and chimney should be employed which provide for cooling of the seals and envelope. The following table applies to the EIMAC SK-400 and SK-410 sockets, or equivalent, with the SK-406 chimney, or equivalent, at sea level and with air at 25°C, and shall be considered as minimum requirements. The approximate pressure-drop values given for the SK-400, or equivalent, are as measured in the socket; those for the SK-410, or equivalent, are as measured in the equivalent of a pressurized chassis or plenum chamber. The data applies with maximum rated anode dissipation.

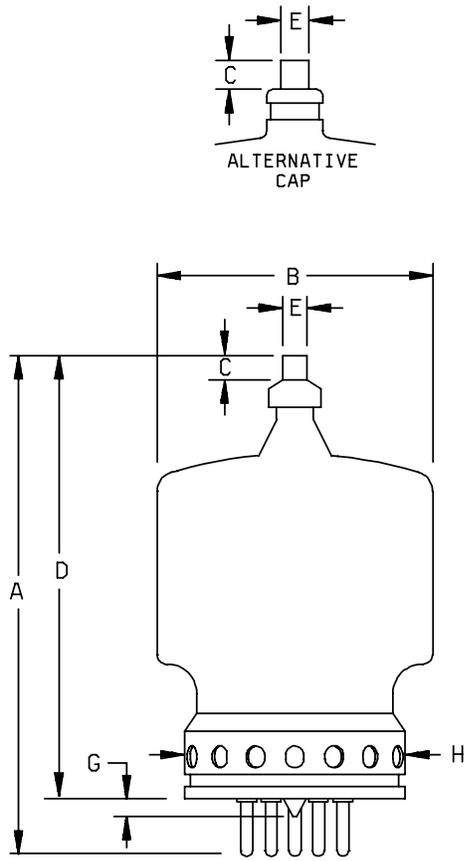
Frequency	SK-400/SK-406, or equivalent		SK-410/SK-406, or equivalent	
	Airflow (cfm)	Approx. press drop (In.H ₂ O)	Airflow (cfm)	Approx. press drop (In.H ₂ O)
30 to 110 MHz	21.0	1.20	21.0	0.60
Below 30 MHz	12.0	0.38	12.0	0.18

Cooling air shall be supplied before or simultaneously with the application of filament voltage and may be removed simultaneously with filament voltage. Operation at higher altitudes or higher ambient temperature will require an increase in cooling airflow.

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TABLE I. Testing and inspection - Continued.

- 5/ In all electrical tests involving application of filament voltage, forced-air cooling is permitted at the rate of 21 cfm maximum, using the SK-400 or SK-410 and SK-406 chimney, or equivalents.
- 6/ The tube shall be mounted vertically, base down or base up. The metal tube-base shell should be grounded by means of suitable spring fingers. The tube shall be protected from severe shock and vibration.
- 7/ During a test period of 5 minutes, the tube shall operate without arcing. Use circuit shown on figure 2, or equivalent.
- 8/ When type 8438 of MIL-PRF-1/887 and type 8188 are physically identical, and have been made in the same production run, differing only in the high-voltage processing and testing of the type 8188, the one sample may represent both types insofar as the listed tests are identical.
- 9/ When type 8438 of MIL-PRF-1/887 and type 8188 are physically identical, and have been made in the same production run, differing only in the high-voltage processing and testing of the type 8188, then one life-test sample may represent both types.
- 10/ This test shall be performed yearly. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level of 6.5 (see 11/). The yearly sampling plan may be reinstated after three consecutive samples have been accepted.
- 11/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

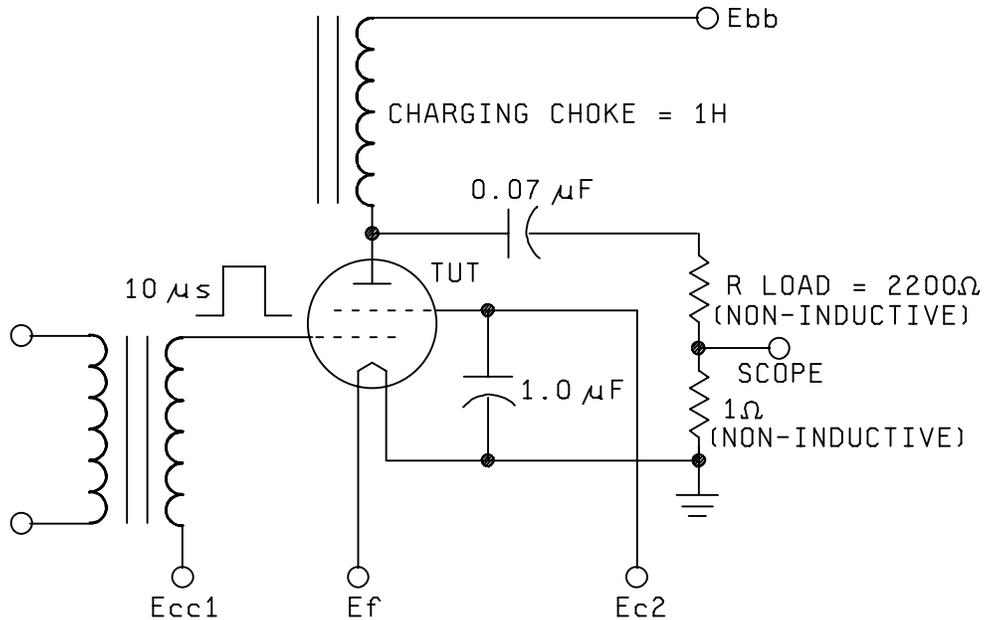


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	5.875	6.375	149.23	161.93
B	---	3.563	---	90.50
G	---	.250	---	6.35
Conformance inspection, part 3 (see note 2)				
C	.328	---	8.33	---
D	5.125	5.625	130.18	142.88
E	.350	.365	8.91	9.27
H	Base: A5-97 EIA			

NOTES:

1. Base pins T and tubulation K are so aligned that they can be freely inserted in a gauge .250 inch (6.35 mm) thick with hole diameters of .204 inch (5.18 mm) and .500 inch (12.70 mm), respectively, located on the true centers by the given dimensions S, U, and V.
2. Dimensions shall be checked yearly. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level of 6.5 (see 11/). The yearly sampling plan may be reinstated after three consecutive samples have been accepted.

FIGURE 1. Outline drawing of electron tube type 8188.

FIGURE 2. High-voltage operation test circuit.

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet references MIL-STD-1311 and MIL-PRF-1/887.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

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